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AUTHORITY

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DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

AVIB-LED

10 FEB 1969

SUBJECT: Letter Report of Evaluation - Balloon Borne Radio Relay (ACL-33/68II)

Commanding General
United States Army, Vietnam
ATTN: AVHGC-DST
APO 96375

1. REFERENCES

a. ACTIV Final Report - Balloon Borne Radio Communication System, 10 April 1965.

b. ACTIV Final Report - Silent Joe (ACL-15/68I)(U), 18 December 1967.

c. Letter, AVHGC-DST, Hq USARV, 12 June 1968, subject: Evaluation of Balloon Communication System (Little Joe).

d. Letter, AVHGC-DST, Hq USARV, 14 July 1968, subject: Evaluation of Balloon Communication System (Little Joe).

2. PURPOSE

To determine if the use of large helium-filled balloons to elevate a radio is a practical and efficient method of improving line-of-sight communications in the Republic of Vietnam (RVN).

3. OBJECTIVES

a. To determine effectiveness of the balloon communication system in increasing radio communication ranges.

b. To determine the reliability and maintainability of the balloon borne radio relay.

4. BACKGROUND

a. An evaluation of three balloon borne radio communication systems was conducted by the Army Concept Team in Vietnam (ACTIV) from 2 October to 30 November 1964. The final report recommended that the system be used

only in temporary situations because of the constant attention and man-hours required to operate the system. In October and November 1967, a 4000-cubic-foot balloon was field tested by the 9th Infantry Division. The tests were successful in increasing the range capabilities of the radio. As a result of the 9th Infantry Division's success, other US Army commanders in RVN expressed a desire for balloons.

b. In answer to the requests, Headquarters, United States Army, Vietnam, requested ten tethered balloons for RVN. In January 1968, the Advanced Research Projects Agency agreed to purchase them for Army operational use. Later, the Military Assistance Command Science Advisor requested five extra balloon systems be purchased as spares. One balloon arrived in April, nine in May, and five in July 1968.

5. DESCRIPTION OF MATERIAL

The balloon system consists of the balloon, winch, parts kit, ground cloth, repair kit, lights, mooring lines, and pennants. The systems were procured from two commercial sources, Goodyear and Schjeldahl. The balloons have the following characteristics:

	Goodyear	Schjeldahl
Length	42 feet	45 feet
Weight	159 pounds	120 pounds
Volume	5,300 cubic feet	5,300 cubic feet
Diameter	15.5 feet	13 feet
Lift Capability	200 pounds	200 pounds
Type Winch	Electric	Gas

6. APPROACH

The balloon systems were issued to each division, separate brigades, and the 5th Special Forces Group (Abn) for evaluation. A technical representative from each manufacturer conducted training classes on the use of the balloons and inflated one for demonstration (Goodyear at Bien Hoa and Schjeldahl at Bear Cat). Each evaluating unit was to evaluate the equipment and submit a letter report. ACTIV monitored the evaluation. The evaluation period extended from May 1968 to 31 October 1968.

7. RESULTS

a. The status of the balloons as of 31 Oct 1968 is shown in Figure 1. Because of the limited life of the balloons, little data was available. During the evaluation it was shown that tethered balloon systems, as airborne platforms for tactical radios, increase communication range by

BALLOON	UNIT	DATES FLOWN	STATUS
Schjeldahl - 1	9th Inf Div	10-13 Apr 68	Destroyed in wind storm.
S - 2	9th Inf Div	22-24 May 68	Destroyed in 35K wind storm.
S - 3	Co B, 5th SFGA	July 1968	Destroyed when attempting to inflate.
S - 4	101st Abn Div		Balloon was not flown due to lack of helium.
S - 5	4th Inf Div		Balloon was not flown due to lack of helium.
S - 6	Americal Div		Balloon was not flown due to lack of helium.
S - 7	173d Abn Bde	22-28 Aug 68	Destroyed at night in 8 to 12K winds, tether line broke.
S - 8	Co A, 5th SFGA		Balloon was not flown. Unit has no operational use for it.
S - 9	Americal Div		Balloon was not flown due to lack of helium.
S - 10	ARPA/MACSA		This balloon was not issued for use.
Goodyear - 1	1st Inf Div		Could not receive air clearance, transferred.
G - 1	173d Abn Bde	3 Sep 68	Destroyed in a 40K wind storm.
G - 2	199th LIB		Could not get air clearance at Long Binh, transferred.
G - 2	Co F, 51st Inf		Could not get air clearance at Bien Hoa, transferred.
G - 2	9th Inf Div	29 Aug 68	Destroyed in wind storm, tether line broke.
G - 3	173d Abn Bde	2 Jun 68	Destroyed in a 52K wind storm.
G - 4	25th Inf Div		Balloon was incomplete and could not be inflated.
G - 5	Co F, 51st Inf	22-30 May 68	Destroyed in wind storm.

FIGURE 1. Balloon Status as of 31 October 1968

increasing line-of-sight. Seven hundred feet and above resulted in achieving the most distant communication ranges, increasing the range of the AN/PRC-25 to 50 kilometers in open terrain and up to 30 kilometers in jungle terrain.

b. One of the major problems throughout the evaluation was the inability of the units to get helium to inflate the balloons. Repair parts and helium were not readily available in the Army supply system.

c. Flying the tethered balloon presented a potential hazard to aircraft operating in the area. There were areas, primarily around heliports and airfields, where clearance could not be granted to fly the balloons. It was necessary to mark the balloon and tether line so that they would be visible both during day and night operations. It was also apparent that the balloon had to be lowered in inclement or stormy weather, thereby making it a fair weather balloon.

8. SUGGESTED IMPROVEMENTS

a. The electric winch required 220 volts of power. This should be changed to 110 volts to match the power available in the using units. A manual crank should also be provided. The drum should be made large enough to hold 2,000 feet of tether line. The gasoline-driven winch was preferred.

b. The balloon should incorporate a safety release valve to outgas a lost balloon. The one provided on the Schjeldahl balloon was suitable.

c. The line counter provided is not necessary, providing the tether line is color-coded at 50-foot intervals.

d. A suitable ground anchor should be provided. Those available in the balloon systems were not sturdy enough to be driven into the ground.

e. The system should be packaged as a complete unit as much as possible to preclude the loss or misplacement of equipment and components.

f. The balloon must have a heavier harness and tether; the 500-pound harness and 1,000-pound tether originally provided were not strong enough.

g. The system should have a pressure regulator. The Goodyear model was suitable.

h. A suitable solution must be found to ground the system to protect it from static electricity.

i. The balloon should be capable of maintaining a reasonably stable flight profile in gusts up to 40 knots.

j. Improvements are required in the winch. It must be capable of retracting the balloon from 2000 feet in the minimum practicable time which will reduce losses due to sudden changes in weather conditions.

9. CONCLUSIONS

a. The concept of balloon borne radio relay to increase line-of-sight communications is valid.

b. The balloon borne radio relay system as evaluated is not practical or efficient for use in RVN.

10. RECOMMENDATIONS

a. The balloon borne radio relay, in its present configuration should not be procured for use in RVN.

b. That no further testing on similar concepts in RVN be conducted until performance and systems reliability have been verified in CONUS testing.

JOHN E. REID
Colonel, Infantry
Commanding

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13. ABSTRACT

The balloon borne radio relay was evaluated to determine if the use of large helium filled balloons to elevate a radio is a practical and efficient method of improving line-of-sight communications in Vietnam. The balloons were procured from two sources, Goodyear and Schjeldahl, and were of the 5300 cubic foot class. Using the balloon to lift an AN/PRC-25 radio and remote control unit AN/GRA-39, the line-of-sight communications were extended to 50 kilometers in open terrain, and up to 30 kilometers in jungle terrain. The balloons were extremely susceptible to changes in weather conditions. Results of the evaluation have shown that, in its present configuration, the balloon borne radio relay using the 5300 cubic foot balloon is not suitable for use in RVN. The concept of balloon borne radio relay to increase line-of-sight communications is valid.

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